Karachi Sindh Class 10 Physics Solved Past Papers

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MCQS – Physics Solved Past Papers



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i) The unit of coefficient of friction is:

A. Newton
B. Kilogram
C. Metre
D. None
Answer:
D. None

ii) An inclined plane 5 m long has one end raised by 1 m, its mechanical advantage will be:

A. 15
B. 5
C. 1/5
D. 1/15
Answer:
B. 5

iii) If two parallel forces have the same direction they are called:

A. Unlike parallel forces
B. Couple
C. Rectangular forces
D. Like parallel forces
Answer:
D. Like parallel forces

iv) The temperature of a substance changes from -20℃ to 20℃, then the temperature change in Kelvin's scale is:

A. 0 K
B. 20 K
C. 40 K
D. 293 K
Answer:
C. 40 K

v) Small drops of rainwater disperse sunlight into different colours is called:

A. Dispersion
B. Interference
C. Rainbow
D. Spectrum
Answer:
C. Rainbow

vi) Amplification can be obtained by:

A. Radar
B. Transistor
C. P.N junction
D. Capacitor

Answer:
B. Transistor

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vii) The image found in plane mirror is:

A. Real
B. Inverted
C. Virtual and erect
D. Real and inverted
Answer:
C. Virtual and erect

viii) Which of the following is more penetrating:

A. α-rays
B. β-rays
C. γ-rays
D. X-rays
Answer:
C. γ-rays

ix) Unit of light intensity is:

A. Pascal
B. Volt
C. Candela
D. Joule
Answer:
C. Candela

x) The circumference of earth was determined by:

A. Muhammad Bin Musa Al Khwarzami
B. Al-Beruni
C. Abu Ali Hassan Ibn-Al-Haitham

D. Yaqub Al Kindi

Answer:

B. Al-Beruni

xi) In British Engineering System 1 horse power(hp) =:

A. 560 ft.lb/s

B. 505 ft.lb/s

C. 550 ft.lb/s

D. 546 ft.lb/s

Answer:

C. 550 ft.lb/s

xii) It is a vector quantity:

A. Distance

B. Displacement

C. Speed

D. Mass

Answer:

B. Displacement

xiii) Archimedes principle is used to determine:

A. Specific gravity

B. Specific heat

C. Specific resistance

D. Specific radiation

Answer:

A. Specific gravity

xiv) The concave lens is used

A. For the correction of shortsightedness

B. Aberration

C. For the correction of longsightedness

D. For a clear picture

Answer:

A. For the correction of shortsightedness

xv) In artificial satellites, the necessary acceleration is provided by:

A. Gravitational force

B. Frictional force

C. Columb’s force

D. Centrifugal force

Answer:

A. Gravitational force

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xvi) A form of disturbance which travels through a medium due to periodic motion of particle about their mean position is called:

A. Time period

B. Resonance

C. Frequency

D. Wave motion

Answer:

D. Wave motion

xvii) If I=1.5 amp, R=10 ohm, then the voltage (V) is:

A. 10 volts

B. 1.5 volts

C. 150 volts

D. 15 volts

Answer:

D. 15 volts

xviii) The rate of change of velocity is called:

A. Torque

B. Acceleration

C. Momentum

D. Speed

Answer:

B. Acceleration

xix) Shunt converts a Galvanometer into:

A. a Voltmeter

B. an Ammeter

C. a Wattmeter

D. a Calorimeter

Answer:

B. an Ammeter

Q.2 a) Define Potential & Kinetic energy, also derive their equations : P.E = mgh and K.E = 1/2 (mv²)

Answer:

Kinetic Energy:

" When a body is capable of doing work by virtue of its motion, the energy is called kinetic energy or the energy associated with a mass due to its motion is called kinetic energy ".

Proof of KE = 1/2mv²:

We know the work done is,

W = F.S ………………………. (i)

From Newton's second law of motion, force is,

F = ma ………………………… (ii)

Using the equation of motion,

$v_f^2 – v_i^2 = 2aS$ ……………..(iii)

let us consider a body initially at rest and then it travels at a speed v and uniform acceleration a, i.e.

$v_i = 0$, $v_f = v$, putting these in equation (iii) we get,

$v^2 = 2aS$

or

$S = v^2/2a$

Since W = K.E,

⇒ K.E = F.S

Putting the values of F and S into the above equation we get

K.E = ma × $v^2/2a$

K.E = $mv^2/2$

or

K.E = (1/2)mv^2

Potential Energy:

"The potential energy possessed by a body in the gravitational fields called the gravitational P.E".

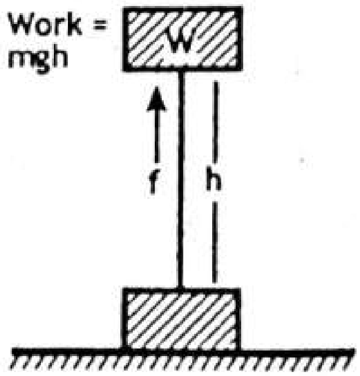
Proof of P.E = mg h:

If a body is lifted up to a position higher than its initial position in the gravitational field of the earth, work is done on it. This work is stored in the body as potential energy. Such potential energy is called gravitational potential energy (P.E).

Consider a body of mass 'm' on the ground. If it is lifted up with constant speed through a vertical height"h" as shown in the figure below, the force required to raise the body is just equal and opposite to its weight W = mg. Thus work done on it against the gravitational field is store in it as gravitational work = mg h

Potential energy (P.E) = P.E = W.h = **mg h**

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Q.2 b) Define simple harmonic motion and prove that the motion of a body attached to the end of spring execute simple harmonic motion.

Answer:
Simple Harmonic Motion (SHM):
“To and fro motion of an object about its mean position in equal intervals of time is known as a simple harmonic motion”
The motion of Mass Attached to spring:
Consider a mass attached to a spring and is placed on a smooth, friction-less surface such that one end of the spring is attached to a solid support and other ends to the mass. When the mass is at rest i.e. at its mean position ‘O’ then the whole system is said to be in equilibrium as shown in fig (a).
Now if we apply some external force Fext on the spring such that the spring gets stretched by pulling the mass to outward then the length of the spring will increase. Let this increase in length is ‘x’ due to the displacement of the mass from point ‘O’ to point ‘A’ as shown in fig (b).

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According to Hooke’s law, force applied will be directly proportional to the displacement i.e.

$F \ \alpha \ x$

or

$F = k x$

Here ‘k’ is the constant of proportionality known as the spring constant.

Now if we remove the force, the mass will move towards its mean position but due to inertia it will not stay there but go further in the same direction such that there is a compression in the string and in this way the mass will keep on moving to and fro about its mean position. That motion of the mass towards the mean position is due to restoring force Fres. This force is given by,

$F_{res} = -k x$ ………………………….. (1)

The negative sign here is due to the restoring force.

Such type of motion is known as simple harmonic motion.

Now according to Newton’s law, we have,

$F = ma$

Comparing this with equation (1), we get

$ma = -k x$

$\Rightarrow a = -(k/m) x$

But as (k/m) is a constant so we can say that acceleration and displacement are directly proportional to each other. i.e

$a \propto -x$

This shows that the vibration of a mass attached to a spring is a simple harmonic motion.

Read more:

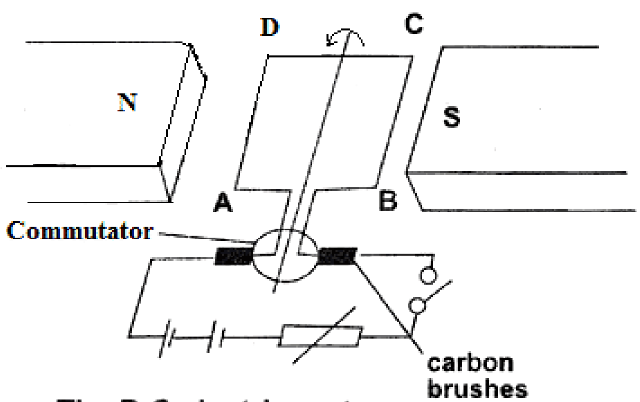
- [Physics notes for class 11 KPK Board Chapter 1 | FSc Pre Engineering]
- [KPK G11 Physics Chapter 2 Vectors and Equilibrium]
- [Sindh English Class 11th Notes Chapter 1 to 14]

Q.3 a) What are simple electric motors? Write down its construction and working with a diagram.

Answer:

Electric Motor:

A device that converts electrical energy into mechanical energy is called an electric motor.



The D.C electric motor

Construction and Working:

Suppose the plane of the coil is initially in a horizontal position. When the current passes from a battery in the direction indicated by the arrows, according to the right-hand rule, the arms AD and BC will be acted on by upward and downward forces respectively. The coil will rotate clockwise. When the coil comes to a vertical position, it becomes a right angle to the field and stops. The field produced due to a current in the coil is along the same direction as that of the field of the magnet. According to the right-hand rule, the magnetic force on the arm AD acts upward and on the arm BC downward. Hence, there is no rotating force acting on the coil in the vertical position. This has been the case for a galvanometer coil to give a full-scale deflection for a 90° rotation. If the coil rotates further in the clockwise direction, a careful examination would reveal that a magnetic force will act to rotate the coil in the anti-clockwise direction. However, if we desire to have a continuous rotation in the clockwise direction, we should change the direction of the field or the current flow on every half rotation of the coil. In most cases, the current direction is reversed at each half cycle.

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As shown in the figure above the end of the coils are attached to a split copper ring, which rotates along with the coil. This split ring is made to have continuous contact with the two stationary pieces of carbon called brushes. These brushes are connected to a battery. The current enters through one brush and leaves through the other. When the coil comes to a vertical position, both the brushes will be at the gaps between the ring segments and no current will flow. However, the coil will continue to move due to its inertia and the ringpieces will come in contact with the brushes again. This time the terminal reverses the direction of the current flow in the coil and causes the arms AD and BC to experience a force downward and upward respectively. Hence the coil continues to rotate in the clockwise direction as long as the current passes through it. The magnetic field arising from the current through the coil changes its direction at each half cycle and thus always points in the opposite direction to the field lines of the permanent magnet.

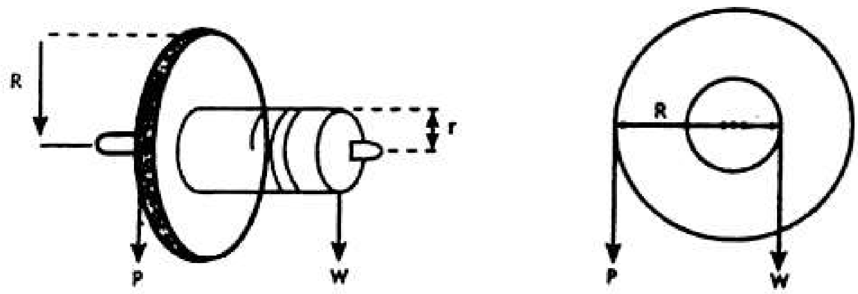
Q.3 b) What is wheel and axle? With the help of a labeled diagram calculate its mechanical advantage.

Answer:

Wheel and Axle:

It is a very simple machine in use for many centuries for lifting heavy loads such as pulling a bucket of water from a deep well. The wheel and axle consist of two cylinders one of larger radius "R" and the other of smaller radius "r" which are mounted on the same shaft which is a common axis of rotation. The cylinder with a larger radius is called the wheel while the cylinder with a smaller radius is called the axle. The shaft is gripped in clamps so that it can be rotated freely.

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The effort is applied at the end of a rope wound around the wheel and the load is tied to a rope wound around the axle in the opposite direction. If the rope around the wheel is unwound, it will cause more rope to be wound around the axle and so it lifts the load.
When the effort applied turns the whéel through one complete revolution, the axle also turns through one revolution. Thus in the same interval of time, the effort will move through a distance of $2\pi R$ and the load will move through a distance of $2\pi r$. If the forces of friction are negligible then,
Output = Input
$W \times 2\pi r = P \times 2\pi R$
$W/P = \pi R/\pi r$
Thus mechanical advantage (M.A) of the wheel and axle system is
M.A. = R/r

Q.4 a) Define Boyle's and Charle's Law and derive the general gas equation: PV = nRT.

Answer:

i) Boyle's Law:

The law states that the volume of a given mass of a gas is inversely proportional to its pressure provided the temperature is kept fixed.
If V and p stand for volume and pressure of gas respectively then,

$V \propto 1/p$
$p V = \text{constant}$
ii) Charles's Law:
This law states that the volume of a given mass of a gas is directly proportional to its absolute temperature provided the pressure is constant. If V and T stand respectively for the volume and temperature of the gas then
$V \propto T$
$V = KT$
where K is constant.

GENERAL GAS EQUATION:

An equation relating all three quantities (pressure, volume, and temperature) is called the general gas equation. We use Boyle's law and Charles's law to obtain this equation. Let p, V and T be the pressure, volume, and temperature of a gas. According to Boyle's law
$V \propto 1/P$ (when the temperature is constant)
According to Charles's law
$V \propto T$ (when pressure is constant)
$V \propto T/P \Rightarrow PV/T = \text{constant}$
If (P1, V1, T1) and (P2, V2, T2) define two states of gas, then
P1V1/T1 = P2V2/T2 =constant ……… (1)

Read more

The value of the constant depends on the mass of the gas expressed in moles. For one mole of the gas, the constant has a particular name the universal gas constant. It is denoted by R. In the system international the value of R is given as
R = 8.3145 J/mol.K
For 'n' moles of the gas, the value of the constant is n R. Hence we have
$P_1V_1/T_1 = P_2V_2/T_2 = nR$
Thus in general, we write
$PV/T = nR$
Or
$PV = nRT$
This is the familiar form of the general gas equation.

Q.18 b) Name two main defects of Human Eye. Describe with the help of ray diagrams show the defects and their correction.

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retina.

concave
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nd then these
stant object

Long-Sightedness:

It is a defect of an eye due to which the eye cannot see the objects clearly which are at a close distance from the person but it can see the far distant placed objects. We also call this defect Hypermetropia. The defect is caused when eye-lens will have low converging power. In this defect, the eyeball of the person will be too short. As the eye will have smaller converging power, therefore, the image of the object will produce at the back of the eye instead of at the retina. Hence, the eye cannot see the real clear image of the object.

Correctness

In order to correct this defect and have a clear image of distant objects, we use spectacles that have convex lenses of suitable power fitted in them. A convex lens has the ability to converge the coming parallel rays at a focus, therefore, they will converge the rays coming from the object i.e. at a point on the surface of the

lens and then these rays will be made converge at the retina. Hence due to this combined converging effect, the person will be able to see a clear image of the distant object in this way.

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Q.5) An electronic heater has resistance of 20 ohm, works at a potential difference of 220 volts. Find the current passing through the heater and the power.

Answer:

Given data:

Resistance = R = 20 Ω

Potential difference = V = 220 volts

To Find:

i) Current = I = ?

ii) Power = P = ?

Solution:

i)

Using Ohm's law;

V = I R

I = V/R

I = 220/20

I = 11 A

ii)

Power = P = I^2R

P = $(11)^2(20)$

P = 2420 W

P = 2.420 k W

Q.6) The focal length of a concave mirror is 15 cm, Where should an object be placed so as to get its real image magnified thrice(three).

Answer:
Given data:
Focal length = f = 15 cm
Magnification = M = 3
To Find:
Position of object to get real image = p =?
Solution:
As we know that by magnification formula

$$M = \frac{q}{p}$$

By putting the value of M we get

q = 3 p

As we know that by lens formula

$$\frac{1}{f} = \frac{1}{p} + \frac{1}{q} \quad \ldots\ldots.(a)$$

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By putting q= 3 p and f = 15 cm in equation (a), we get

Hence, if we place the object at 20 cm, we will get a real image of thrice magnification.\

Q.7) A ball is dropped from a tower, it reaches the ground in 10 seconds. Calculate the height of the tower and the velocity with which it hits the ground.

Answer:
Given Data:
$V_i = 0\ ms^{-1}$
$g = 9.8\ ms^{-2}$
t = 10 sec.
To Find:
Height = h =?

Solution:

To find ‘h’ we will use the second equation of motion:

$h = V_i t + 1/2\ gt^2$

$h = (0)(10) + 1/2\ (9.8)(10)^2$

$h = 0 + (4.9)(100)$

h = 490 m

Now from first equation of motion,

$V_f = V_i + gt$

$V_f = 0 + (9.8)(10)$

$V_f = 98\ ms^{-1}$

Q.8) Find the amount of heat required to raise the temperature of 100 gm of water form 10°C to 60°C. (Specific heat of water = 4200 J/Kg°C)

Answer:

Given Data:

mass = m = 100 gm = 0.1 kg

C = 4200 J/Kg°C

$\Delta T = 60°C – 10°C = 50°C$

To Find:

Amount of heat required = Q =?

Solution:

Using equation,

$Q = m\ C\ \Delta T$

$Q = (0.1)(4200)(50)$

Q = 21000 J

Q.9) A force is acting at an angle 60° with x-axis. If the x-component of the force is 50 Newton. Find resultant force and y-component of the force.

(Sin60°=0.866, Cos60°=0.5)

Answer:

Given Data:

x-component of the force = F_x = 50 N

$\theta = 60°$

To Find:

Resultant force = F = ?

y-component of the force = F_y =?

Solution:

i) Resultant force:

$F_x = F \cos\theta$

$F = F_x / \cos\theta$

$F = 50 / \cos 60°$

$F = 50/0.5$

F = 100 N

ii) y-component of the force:

$F_y = F \sin\theta$

$F_y = 100 \sin 60°$

$F_y = 100 \times 0.866$

$F_y = 86.6$ N

Q.10) Calculate the orbital velocity of artificial satellite required moving around the earth if radius of earth is 6×10^6m and the value of "g" is 10 m/s^2.

Answer:

Given Data:

radius of earth = r = 6×10^6 m

g = 10 ms^{-2}

To Find:

orbital velocity of artificial satellite = V = ?

Solution:

Using the equation,

$V = \sqrt{(gR_e)}$

$V = \sqrt{(10 \times 6 \times 10^6)}$

$V = \sqrt{(6 \times 10^7)}$

V = 7745 ms^{-1}

Q.11) When a sound wave of frequency 200 Hz and wave length 300 cm passes through a medium. Calculate the velocity of the wave in the medium.

Answer:

Given Data:

frequency = f = 200 Hz = 200 s^{-1}

wavelength = λ = 300 cm = 3 m

To Find:

velocity of the wave = v = ?

Solution:

Using the equation,

$v = f \lambda$

$v = 3 \text{ m} \times 200 \text{ s}^{-1}$

$v = 600 \text{ ms}^{-1}$

Q.12) How much energy will be released when 50 gm of mass is completely transformed to energy?

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Answer:

Given data:

Mass = 50 gm = 0.05 kg

$c = 3 \times 10^8 \text{ m/s}$

To Find:

Energy released = E =?

Solution:

As we know that by energy-mass equation

$E = mc^2$

By putting values in above equation, we get

$E = (0.05 \text{ kg}) (3 \times 10^8 \text{ m/s})^2$

$E = (0.05 \text{ kg}) (9 \times 10^{16} \text{ m}^2/\text{s}^2)$

$E = 0.45 \times 10^{16} \text{ kg m}^2/\text{s}^2$

Or

$E = 4.5 \times 10^{15}$ Joule

Q.13) Give scientific reason:

i) Why is sliding friction greater than rolling friction?
ii) Why is an ammeter, low resistance connected in parallel with the coil of a galvanometer?

Answer:
i) Since friction depends on the area of contact between the surfaces. The greater the area of contact between the surfaces greater will be the friction and vice versa. The rolling friction is less than the sliding friction because in rolling friction area of contact is smaller than the sliding friction.
ii) As we know that the range of galvanometer for the measurement of current is very small, so a cannot be used for measuring large current and hence need proper modifications. Fortunately, there is an easy way out of this difficulty. A low resistance that bypasses the great part of the current is placed parallel with the galvanometer coil. Only a small known fraction of the total current passes through the galvanometer coil. This resistance acts as a Shunt resistance.

Q.14) Write down two differences between:

i) N-type substances and P-type substances
ii) Fundamental quantities and derived quantities.

Answer:
i) N-type materials:
If a silicon crystal is doped with a pentavalent element such as arsenic, four out of five valence electrons of an atom form four covalent bonds with four neighbouring silicon atoms. The fifth valence electron is, however, free to move about, which makes the doped silicon crystal a better conductor. We call this material an n-type semiconductor because there is an excess of negative electrons in it to form an electric current.
P-type materials:
If a silicon crystal is doped with a trivalent element such as indium, all the three available electrons of an atom form three covalent bonds with three neighbouring silicon atoms. A space called a hole is therefore left in the silicon crystal due to the shortage of an electron. This hole behaves like a positive charge and can move from place to place in the crystal on the application of the potential difference. Such a material is called p-type materials.
ii) Fundamental quantities:
There are seven physical quantities that form the foundation for other physical quantities. These physical quantities are called Fundamental quantities.
These are length, mass, temperature, electric current, the intensity of light, and the amount of a substance.
Derived quantities:
Those physical quantities which are expressed in terms of Fundamental quantities are called the derived

quantities.
These include area, volume, speed, force, work, energy, power, electric charge, electric potential, etc.

Q.15) State Joule's law and derive equation $W=I^2Rt$

Answer:
Joule's law:
" The amount of heat generated in resistance due to the flow of charges is equal to the product of the square of current I, resistance R and the time duration t ".
Proof:
Consider two points with a potential difference of V volts. If one coulomb of charge passes between these points; the amount of energy delivered by the charge would be joule. V Hence, when Q coulomb of charge flows between these two points, then we will get QV joules of energy. If we represent this energy by W, then
Electrical energy supplied by Q charge W = QV joules
Now current, when charges Q flow in time t, is defined as: or Q = It
So the energy supplied by Q charge in t seconds = W = V × I × t
This electrical energy can be converted into heat and other forms in the circuit.
From Ohm's law, we have V = IR
So the energy supplied by Q charge is $W=I^2Rt$
This equation is called Joule's law.

Q.16) Describe briefly 4 electromagnetic waves with their ranges.

Answer:
The spectrum of electromagnetic radiation consists of radio waves, microwaves, infrared waves, visible waves, ultraviolet waves, X-rays and gamma rays, etc. A brief description of the range of each type of wave is given as follows.

Radio Waves are electromagnetic waves with a large range of wavelengths from a few millimetres to several metres.
Microwaves are radio waves of shorter wavelengths between 1 mm and 300 mm. Microwaves are used in radar and microwave ovens.
Infrared waves are also called heat waves, these waves are radiated by hot bodies at different temperatures. The earth's atmosphere is at a mean temperature of 250 K and radiates infrared waves with a wavelength having a mean value of 10 micrometres or
10^{-5} m (1 μm 10^{-6} m).

Visible Waves have a wavelength range between 400 and 700 nanometres. The peak of solar radiation is at a wavelength of about 550 nm. The human eye is most sensitive to this wavelength.
Ultraviolet waves, their wavelength ranges from 380 nm down to 60 nm. These are emitted by hotter stars having a mean temperature greater than 25000 °C.
X-rays wavelength ranges from 1.0 nm to 0.01 nm.

Gamma rays their wavelength is less than 10-11 m. They are emitted by the nucleus of certain radioactive substances. They have also been released during certain nuclear reactions These wavelength ranges are not exact and the values given here are only for a general guideline.

Q.17) State Newton's second law of motion and derive F=ma.

leration is

ne applied

a force of unit

magnitude is applied, then obviously K = 1 and so

F = ma

Examples:

i) If we increase the force applied on a body, it moves faster which means more acceleration is produced and if a small force is applied then the acceleration produced is small.

ii) If equal forces are applied on two bodies of different masses, then the acceleration produced in the body of smaller mass will be more than the acceleration produced in the body of large mass.

Q.18) Define:

- **i) Viscosity**
- **ii) Surface tension**
- **iii) Center of gravity**
- **iv) Couple**

Answer:

i) Viscosity:

The property by virtue of which a fluid tends to oppose the relative motion between its different layers is called viscosity or internal friction of the liquid.

ii) Surface tension:

Surface tension is the property of a liquid by virtue of which the free surface of a liquid behaves like a stretched membrane tending to decrease the surface area.

iii) Center of gravity:

It is a point inside or outside the body at which the whole weight of the body is acting.

iv) Couple:

Two equal but opposite parallel forces which act at different points on the body make together a couple.

Q.19) What are transistor? Write its two types with the help of circuit diagram.

Answer:

Transistor:

A transistor is a semiconductor that consists of a thin central layer of one type of semiconductor material sandwiched between two relatively thick pieces of the other type. The central part is known as the base (b) and the pieces at either side are called emitter (e) and the collector (c).

There are two types of transistors: NPN and PNP. Which are shown in the figure below.

